AMENDMENTS TO THE SPECIFICATION

In the specification of the Application, please amend paragraphs 0001-0003 as hereinafter indicated.

[0001] The present invention relates to collision warning, avoidance, and countermeasure systems for an automotive vehicle. More particularly, the present invention is related to systems and methods of determining positions and velocities of vehicles relative to each other.

[0002] Collision warning, avoidance, and countermeasure systems are becoming more widely used. Collision warning systems are able to detect an object within proximity of a host vehicle and assess whether the object detected is an obstacle and poses a threat to the host vehicle. These systems also provide a vehicle operator knowledge and awareness of obstacles or vehicles within a close proximity in time such that the operator may perform actions to prevent colliding with the detected obstacles. Countermeasure systems exist in various passive and active forms. Some countermeasure systems are used in the prevention of a collision, and others are used in the prevention of an injury to a vehicle operator.

[0003] Collision warning systems ~~maybe~~ may be forward or rearward sensing. These systems can indicate to a vehicle operator that an object, ~~that~~ which may not be visible to the vehicle operator, is within a stated distance and location relative to the host vehicle. The vehicle operator may ~~than~~ then respond accordingly. Other collision warning systems and countermeasure systems activate passive countermeasures such as air bags, ~~load limiting~~ load-limiting seat belts, or active vehicle control including steering control, accelerator control, or brake control whereby the system itself aids in preventing a collision or injury.

Please also amend paragraph 0006 in the specification as hereinafter indicated.

[0006] Additionally, in using current [[GPS]] GPSs, each vehicle's GPS must be able to receive signals from at least four satellites simultaneously for the proper functioning thereof. Buildings, overpasses, foliage, and terrain may limit the number of satellites that are "visible" to the receivers of a GPS. Thus, these limitations reduce the effectiveness of current GPSs in determining vehicle

PVT data for the purposes of vehicle safety, navigation, and ~~Telematics~~ telematics.

Please also amend paragraphs 0009-0013 in the specification as hereinafter indicated.

[0009] The embodiments of the present invention provide several advantages. One such advantage is the provision of communicating vehicle information with respect to a host vehicle utilizing orthogonal frequency domain modulation (OFDM) transceivers. In so doing, the stated embodiment aids in [[the]] reducing [[of]] the number of satellites that need to be visible while increasing the accuracy of [[the]] measurements performed.

[0010] Another advantage provided by an embodiment of the present invention[[,]] is the provision of an ~~OFDM based~~ OFDM-based object information system that is self-contained and packaged to be easily installed or ~~retrofit~~ retrofitted into various vehicles.

[0011] Yet another advantage provided by an embodiment of the present invention[[,]] is the provision of [[a]] an ~~OFDM based~~ OFDM-based object information system that is in communication with other onboard vehicle systems[[,]] such as a navigation system[[,]]; a telematics system[[,]]; and a collision warning, avoidance, and countermeasure system.

[0012] The present invention itself, together with attendant advantages, will be best understood by reference to the following detailed description, ~~taken~~ when viewed in conjunction with the accompanying drawing figures.

[0013] For a more complete understanding of ~~this~~ the present invention, reference should [[now]] be [[had]] made to the embodiments illustrated in greater detail in the accompanying drawing figures, and also described below by way of examples of the invention, wherein:

Please also amend paragraph 0016 in the specification as hereinafter indicated.

[0016] Figure 3 is a top view of a sample ~~vehicle merging~~ vehicle-merging situation for a pair of vehicles each having a GPS and a two-way radio;

Please also amend paragraph 0018 in the specification as hereinafter indicated.

> [0018] Figure 5 is a block diagrammatic view of an ~~OFDM based~~ OFDM-based object information system in accordance with an embodiment of the present invention;

Please also amend paragraph 0024 in the specification as hereinafter indicated.

> [0024] GPS errors are normally categorized as either system errors or user errors. System errors are errors that arise from a GPS system itself. The system errors, for example, can include synchronization errors between satellites, synchronization errors with a central clock, inaccuracies in satellite PVT data, number of visible satellites at any given time, velocity and timing aspects within the satellites, and accuracy of the timing signal shape. Also, the relative position of the satellites affects geometric dilution of precision (GDOP), which amplifies range errors. Range errors refer to the distance between the satellites and the GPS receivers. Small angle between the range lines causes high GDOP. High GDOP refers to magnification in ~~measurements~~ measurement errors in the length of the range lines due to the satellites being located near the horizon.

Please also amend paragraphs 0028 and 0029 in the specification as hereinafter indicated.

> [0028] The present invention not only minimizes receiver errors and environmental errors, [[but]] it also minimizes system errors as is described in further detail below. Also, the present invention provides improved geometry of the range measurements, especially when satellites are not located near the horizon relative to a vehicle. Horizontal range information is derived from the time-of-flight of OFDM signals. Since the OFDM signals travel a short distance between vehicles, environmental factors are negligible. Also, the path that the OFDM signals travel is close to or approximately the same in length as the path that is measured, thus reducing the GDOP.

> [0029] In the ~~following~~ drawing figures discussed as follows, the same reference numerals will be used to refer to the same or similar type of components. While the present invention is described herein with respect to systems and methods of determining positions and velocities of vehicles relative to a host vehicle, it is to be understood that the present invention may also be adapted and applied to various systems including[[:]], for

example, collision warning systems, collision avoidance systems, parking aid systems, reversing aid systems, countermeasure systems, vehicle systems, navigation systems, telematic systems, Cooperative Adaptive ~~Cruse~~ Cruise Control systems, or other systems that may require object position or velocity determination. The present invention may be applied in vehicles[[,]] such as cars, trucks, buses, and boats. The present invention may also be utilized in a portable format for use by bicyclists and pedestrians. The present invention may be applied to any application where proximity measurements are performed.

Please also amend paragraph 0035 in the specification as hereinafter indicated.

[0035] Referring now to Figure 1, a block diagrammatic view of object relative information systems 10 utilizing GPSs 12 and two-way radios 14, as applied to a vehicle situation, is shown. Each of the GNSs or GPSs 12 includes a controller 16. The controllers 16 determine the approximate ~~position~~ position(s) of vehicles A and B in a Cartesian coordinate system (not shown). GPSs, in general, indicate PVT data using the 1984 World Geodetic System (WGS84) or Universal Transverse Mercator (UTM) coordinates, which are readily converted to a flat Cartesian coordinate system. WGS84, UTM, and similar geodetic ~~system~~ systems describe the coordinate system of the position and time values. Position, velocity, and time (PVT) data 18 is collected in the GPSs 12 and received by the controllers 16. This data may be collected from the GPSs 12 using National Marine Electronics Association (NMEA) communications standards. NMEA is used to determine the type of physical wire used, the type of signals that travel over the wire, the type of data encoding, and the type of data packet format. The PVT data 18 is exchanged between the vehicles A and B using the two-way radios 14. Although the two-way radios 14 are shown in Figure 1, the PVT data 18 may be exchanged utilizing wireless modems or network devices, such as those that conform to the IEEE 802.11a or Dedicated Short Range Communications (DSRC) specifications.

Please also amend paragraph 0041 in the specification as hereinafter indicated.

[0041] Referring now to Figure 4, a sample position diagram for a GNS or GPS 30 of an automotive vehicle 32 is shown. The GPS 30 determines the position of the vehicle 32 in response to satellite range signals 34 received from the satellites 36. The satellites [[34]] 36 may include one or more pseudolites, such as the pseudolite 38. Pseudolites represent simulated satellites and

may, for example, be in the form of a beacon. Pseudolites are utilized when some or all of the satellites 36 are not visible to the GPS 30. This may occur when the vehicle 32 is in a parking garage, under an overpass, or when portions of a building or foliage are obstructing communications between the satellites 36 and the GPS 30.

Please also amend paragraph 0044 in the specification as hereinafter indicated.

[0044] Referring now to Figure 5, a block diagrammatic view of an ~~OFDM based~~ OFDM-based object information system 50, in accordance with an embodiment of the present invention, is shown. The ~~OFDM based~~ OFDM-based system 50 includes multiple vehicles 52, each of which having an object relative status determination system 54 [[and]] or 54', ~~respectively~~[[,]] and each also having one or more OFDM transceivers 56. [[The]] Each of the object systems 54 and 54' ~~have~~ has a GNS or GPS 58 that includes a GPS antenna 60, a radio frequency (RF) unit 62, a digital signal processor (DSP) 64, and a main controller 66. The GPSs 58 are in communication with one or more satellites 68, which are best ~~seen~~ shown in Figure 7. The satellites 68 may be replaced with one or more pseudolites, NAVSAT satellites, or the like. GPS signals or satellite range signals 70 are received by the GPS antenna 60 and the radio frequency units 62, are filtered and conditioned via the processors 64, and are utilized by the controllers 66 to determine the position of an associated vehicle.

Please also amend paragraph 0046 in the specification as hereinafter indicated.

[0046] The OFDM transceivers 56 are in communication via an OFDM Media Access Protocol (MAC) vehicle network interface 82. The OFDM interface 82 allows many mobile devices to interoperate in the same radio frequency band. The OFDM interface 82 utilizes an *ad hoc* mode whereby there is no hierarchy between mobile nodes. This is unlike that of a ~~Bluetooth type~~ Bluetooth-type MAC, which operates under the constraint of frequency hopping and narrow band modulation and requires the use of Piconets and Scatternets in which nodes have master, slave, and master/slave functions. The OFDM transceivers 56 transmit and receive object range signals 83, as well as other signals, between each other via the vehicle network interface 82.

Lastly, please also amend paragraph 0085 in the specification as hereinafter indicated.

> [0085] While the present invention has been described in connection with one or more embodiments, it is to be understood that the specific mechanisms and techniques ~~which~~ that have been described herein are merely illustrative of the principles of the invention, and that numerous modifications may be made to the methods and ~~apparatus~~ apparatuses described herein without departing from the spirit and scope of the invention as defined by the appended claims.